# AN ANALYSIS OF INDIAN LAND SALES IN MILLER TOWNSHIP, KAY COUNTY, OKLAHOMA, 1956-58

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AN ANALYSIS OF THE INDIAN LAND SALES IN MILLER TOWNSHIP,

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# CHAPTER I

## INTRODUCTION

A large proportion of farmers, or persons contemplating farming, have been confronted or will be confronted with the problem of selecting a farm or additional units of land. In either event, problems of evaluating the land resource as a basis for organization and reorganization arise.

No one knows the true value of a farm. Value depends upon the future, which is always a question in the present. Value is measured in terms of price in the free enterprise economy and the valuation process is accomplished by consumers themselves as they spend their incomes.[1]

A market price is established whenever one sells or buys farm real estate. The appraised value of a particular farm or of all farms in an area can be estimated on the basis of the prices at which other properties have been transferred, or in terms of the capitalized value of the income that is expected to be received in the future. Because price is the chief economic regulator in our economy, the prices established for farmland determine how much land will be combined with other productive factors in a particular farm business and in agriculture as a whole.[2]

We often speak of the land market as though it were similar to a market for farm products, but actually it has few of the usual characteristics

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[1] Richard H. Leftwich, The Price System and Resource Allocation, Rinehart and Company, New York, 1955, p. 15.

[2] William H. Scofield, "How Do You Put A Value on Land?", Land, The Yearbook of Agriculture, Washington, D. C., 1958, p. 184.

of a product market. Larson has stated that a market may mean (1) the place where buying and selling take place, (2) an area in which a good is sold, (3) a group of people carrying on buying and selling, (4) the commodity traded, or (5) time (for example, the grain futures markets).[3] He further states that a market is the mechanism through which exchanges are made. The idea of a market and that of competition are closely related in the minds of most people in the United States.

A purely competitive market can exist only under conditions of pure competition which is characterized by three conditions:

> "(1) Each buyer or seller must be so small in relation to the entire market in which he operates that he cannot influence the price of whatever he buys or sells. (2) No artificial restrictions are placed on demands for, supplies of, and prices of goods or resources, and (3) Mobility of goods and services and resources exist in the economy."[4]

When the participants in a market possess complete knowledge of the economy, this additional requirement is considered by economists to be the difference between pure and perfect competition.

## The Land Market

The market for farmland has few of the above characteristics.

> "The first significant hazard in farm purchase arises from the fact that a farm is a rather large total operating unit which is not readily divisable. Normally the farm is not sold in small, homogeneous segments which might allow the buyer to test his investment by buying a few acres at a time as he might buy a few shares of industrial or commercial stock. Even if he could, the performance of this segment would not be a reliable indicator to show him how the farm would pay out as a whole. Usually the

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[3] Adlowe L. Larson, Agricultural Marketing, Prentice-Hall, New York, 1951, p. 33.

[4] Richard H. Leftwich, op. cit. p. 24, 25.

> farmer must assume the risk of buying the whole farm or none of it. From this it follows logically that the size of the investment is likely to be large and, therefore, the consequences of a mistake in judgment may be very costly.... The next pertinent characteristic is that farms, unlike many items that are sold, are not standardized. It is possible to buy five thousand bushels of wheat without seeing it in advance and yet to know within reasonable limits the characteristics of the wheat that will be delivered. This is because wheat is sold on standardized grades under government inspection. In contrast, each individual farm must be evaluated separately and this evaluation is difficult because so many unknowns must be estimated. Even adjoining farms which, on the surface, appear to be very similar, may exhibit important differences in productivity. A third characteristic is that in a given area, comparatively few farms are sold within a relatively short span of time. As a result, the limited local sales which might be used as bases for comparison, may not reflect, in any sensitive way, the broader conditions of supply and demand for farms. Because of either small or large local supply relative to the demand for farms, local prices may differ significantly from those which would be suggested by the general economic prospects for farming. A fourth confusing characteristic of farm values is that they are commonly influenced by personal preferences which are hard to evaluate. The characteristics of the people of the community, the location of the farm with reference to schools and other facilities and the community characteristics in general, all exert subjective influences on the value of any particular farm. At times, also, farm real estate values are disturbed by changes in the general price level. Inflation of prices temporarily may increase the gross income from farming and induce buyers to bid up the prices of farms to levels which long-time farm earnings may not justify. Thus, the prospective buyer of a farm must commit himself to a large investment without the benefit of a standardized, sensitive market as his yardstick of value and he must do this in face of the fact that the long-time productive value of farms may be obscured by personal considerations which are hard to evaluate and by temporary changes in the general price level."[5]

Despite these limitations land prices within local areas tend to respond to changes in prices and income expectations. Income expectations may differ for each firm involved in the market because each firm may be combining the factors of production, land, labor, and capital, in different combinations.

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[5]Geoffrey P. Collins, "Lecture Notes in Agriculture Finance", Oklahoma State University, 1958.

Man is continuously looking for new and improved ways of producing goods and services. Changes in production methods that enable him to obtain larger quantities of product with the same or fewer inputs are called technological improvements.[6] Prices for factors and products, along with other forces, help determine the size of the farm which can exist profitably in the long run. In a competitive industry, the pressures of market forces are such that the techniques of production and number and size of producing units must result in minimum long-run costs if resource owners are to maximize returns on resources. The market adjustment can be in either one of two directions. Prices received for commodities produced may fall to a level which allows only firms of an optimum size and technique to exist or prices paid for resources and resource services can rise to a level which brings about the same equilibrium.[7]

In making market adjustments, the farmer views the effect of different quantities of a resource with regard to its effects on his total receipts and total costs. With respect to land, if a larger quantity will add more to total receipts than to total costs, additional land will increase profits. On the other hand, if larger quantities of land will add more to total costs than receipts, profits will decline. The firm should employ that quantity of the resource at which the contribution of a unit of that resource to total receipts equals the contribution of a unit of it to total costs if profits are to be maximized.[8]

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[6] C. E. Bishop and W. D. Toussaint, Introduction to Agriculture Economic Analysis, p. 225, John Wiley and Sons, New York, 1958.

[7] Earl O. Heady, Economics of Agriculture Production and Resource Use, Prentice-Hall, New Jersey, 1952, p. 371.

[8] Richard H. Leftwich, op. cit. p. 276.

The value added to a farm's total receipts by the employment of additional units of resource are called the"marginal value of product" of the $i^{th}$ resource and may be expressed as $MVP_i$

$$\left( \frac{\frac{\partial Y}{\partial X_i} P_y}{P_{X_i}} \right).$$

An additional unit adds a certain amount of product to a farm's total output ($MPP_i$). The additional output can be sold at its market price ($P_y$). These two, $MPP_i$ and $P_y$, multiplied together gives us $MVP_i$. We then can form the profit maximizing condition in either of the following forms:

$$(1) \quad MVP_i = p_i \text{ or, } MPP_i \ (P_y) = P_i.$$

An individual farm firm demand curve for land is the "value of marginal product" curve for that resource. It cannot be assumed that the individual farmers' demand curves can be summed in the actual business world to obtain a market demand curve. The land market has so many special features and presents so many exceptions to the theoretical purely competitive market that only approximations of demand curves may be made from data which are available.

The effect of new technology or innovations is felt in lowering unit costs through increasing yields and by replacing labor with various forms of capital. Land area is limited in the important agricultural areas. If the cost advantages are great for large acreages, the size of farms in terms of the number of acres can be increased only as some farms are liquidated or decreased in size. In other words, some market force must

cause operators of some farms to relinquish their units in order that farm enlargement can take place.[9]

## The Problem Statement

Agricultural production or output is achieved as a result of various inputs. The amount of output produced is dependent upon the quantity and quality of the inputs. The purpose of this thesis is to identify and evaluate the major factors influencing the price persons are willing to pay for land, the basic input of agricultural production in the area studied.

A price determining function is a means of describing the price making forces for a given factor or product. A generalized price function of interest to farm land purchasers or sellers may be written as

$$Y = f(X_1, X_2, X_3, X_4 \ldots X_n)$$

where:

$Y$ = price of land per acre,

$X_1$ = percent cropland,

$X_2$ = distance from present operation,

$X_3$ = land class.

$X_4 \ldots X_n$ = other valuables such as length of lease, wheat yields, crop allotments and other relevant factors.

This equation states that Y depends upon the values of $X_1, X_2, X_3 \ldots X_n$. A change in any one or any combination of the independent variables will result in a change in the price of land (Y).

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[9]Earl O. Heady, op. cit. p. 372.

The purpose of this research is to determine by statistical measurements the relative importance of various factors determining farm land values to different individuals in the area studied.

Studies in other areas have shown high correlations between certain factors and land price. For example in Iowa, one study found that only four factors, (1) average yield of corn, (2) percentage of land in corn, (3) percent of land in small grain, and (4) percent of land not plowable, explained most of the variations in farm values.[10] In a recent study in Garfield County area, 47 percent of the variation of land prices was explained by three factors: (1) acreage allotment per 100 acres, (2) yield per acre, and (3) percent mineral rights conveyed.[11] These and other studies indicate that only a rough approximation can be made of the variation in land prices and also indicate that the relative importance of factors will vary between areas of the country. These studies were made of the actual prices paid by purchasers and do not attempt to evaluate prices offered by the potential purchasers for farm land.

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[10] Henry A. Wallace, "Comparative Farm Values in Iowa", Journal of Land and Public Utility Economics, Volume II, No. 4, October, 1926.

[11] Billy H. Stewart, Analysis of the Farm Real Estate Market in Beckham and Garfield Counties, Unpublished Masters Thesis, Oklahoma State University, 1958, p. 22.

# CHAPTER II

## RESEARCH METHODS

### The Data

The area studied in this report includes some of the most productive farm land in the State of Oklahoma. It comprises that portion of Kay County south of highway 60 and east of the Indian meridian with the legal description of Township 25 North, Range 1 East and 2 East (Figure 1).

The history of this area is picturesque. It is located on the east boundary of the original Cherokee Strip of the Indian Territory. An area formerly abounding with herds of buffalo and wild game, the leasing of grazing privileges to cattlemen was a forewarning of the settlement of the area.

The Ponca Indian Tribe was given the privilege of selecting a new reservation in the Cherokee Strip when they were required to move from Nebraska. The following excerpt from a story of Joe Miller as a boy describing to Chief White Eagle and the Ponca Chiefs the area now known as Miller Township is quoted:

> "With a stick the boy drew upon the dirt floor of the tepee a rough map. He showed them where the Chikaskia met the Salt Fork and where that river ran into the Arkansas; where the valleys widened and where the high prairie was to be found. He told them of the horse-high bluestem in the valleys and the heavy hanging vines of wild grapes in the timbered bends; of the tall pecan and the thickets of plums; of the prairie chickens which flew from under the ponys (sic) feet, and of the deer and turkey which ranged through the timber. Of the red bluffs of the Salt Fork and the streams of water where a pony could always drink they heard him tell, and they wondered when he told them how the

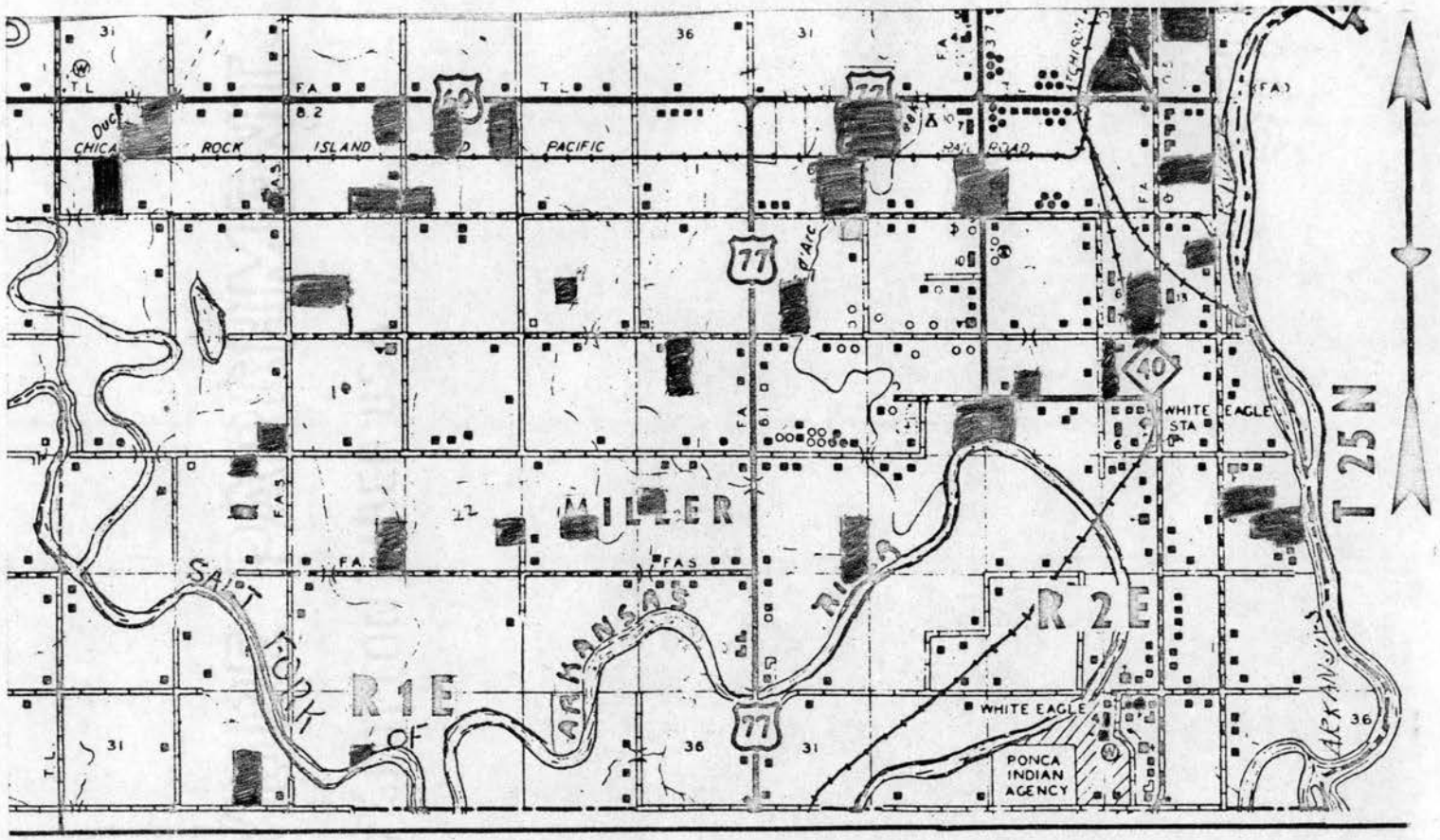


Figure 1. A Map Showing the Distribution of Indian Land Sales in Miller Township, Kay County, Oklahoma, 1956-58

> sand bars in the summer whitened with salt; to the Poncas, homesick and famished, and stricken with fever and no land to call their own, the picture made in their minds by the story of the boy was that of the Promised Land."[12]

The Poncas did select the area as part of their reservation. The land was alloted to the tribesman and immediately its productive capacity was recognized. The 101 Ranch was located near the Salt Fork River on land leased from the Poncas and as the individual owners with the approval of the Bureau of Indian Affairs were allowed to sell portions of their allotments, white farmers purchased these tracts. Two of the most famed diversified farms in the United States were located in Miller Township -- the Miller Brothers "101 Ranch" and the Vanselous "Big V" Ranch.

For a period of 30 years, 1926 to 1956, no land sales were held by the Bureau of Indian Affairs. In 1956 this policy was changed and individual Indian Owners were again allowed to sell their land by sealed bid accompanied by 10 percent of the offered price. The data used in this report were obtained when all bids giving the tract number, bidders name, and his offered price were opened publicly and read.

It is from these sealed bids that the data for this study were obtained.

## General Procedures

The sales analyzed in this report include a period from May 1956 to May 1958 during which time 32 tracts were sold. A total of 76 different

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[12] Gareth Muchmore, "Ponca Indians Have Strong Link to Area History", The Ponca City News, September 16, 1955, p. 7-B.

bona-fide bids were received on these 32 tracts. Each tract was described in terms of information on the following items from the Agricultural Stabilization and Conservation Office at Newkirk, and the Soil and Moisture Branch Office of the Bureau of Indian Affairs at Ponca City:

1. the total acres in the tract,
2. the acres cropland,
3. percent cropland,
4. land class and acreages of each class,
5. years of agricultural lease remaining,
6. mineral rights,
7. oil lease,
8. average wheat yield,
9. acres of wheat allotment.

In addition to the above, the bid received from each prospective bidder was classified as follows:

1. price per acre offered,
2. amount of bid,
3. distance from bidder's present operation,
4. purpose for which land was to be used,
5. whether or not the bidder held the present agricultural lease,
6. major occupation of the bidder,
7. present size of the bidder's farm operation.

The uniformity of land in the area simplified comparisons between tracts. According to a recent (1959) Soil Conservation Service survey, 49 percent of the Kay County farmland has a slope of less than 1 percent.

Miller Township, lying between three rivers, the Arkansas, the Chikaskia, and the Salt Fork of the Arkansas is comprised of 70 percent class 1 and 2 land according to the Soil Conservation Service Land Use Surveys.

The type of farming in this area is primarily wheat with beef cattle grazing during the winter season on small grains. Alfalfa, sweet clover, and other legumes grow well on upland and the creek or river bottoms. Silage crops are used extensively by the few dairymen and beef cattle feeders in the area.

Markets are close with grain elevators at Ranch Drive, Marland, Tonkawa, and Ponca City. Major highways in the area are U.S. 77, U.S. 60, and Oklahoma 40. School buses transport all highschool students to Ponca City and Tonkawa. Two rural grade schools, Union 98 and Whiteagle, are still maintained.

None of the tracts sold had any improvements of value except for some fences. The location with respect to improved roads in the area was examined and the data indicated the higher-priced tracts were not generally adjacent to these roads.

## Analytical Procedures

The data were assembled in table form from the 76 bids received and examined for any obvious differences. Correlations were run between price and 15 factors. The 32 successful bidders were then tabulated and a correlation study made of the same 15 factors.

A regression analysis was performed using three independent variables, selected on the basis of the correlation analysis, with price per acre as

the dependent variable. The three independent variables were (1) percent cropland, (2) distance from the operator's present operation, and (3) predominate land class.

# CHAPTER III

## TABULAR ANALYSIS

During the two year period 32 tracts of land, containing a total of 1,816 acres and averaging 57 acres per tract, were sold by the Indian Department at an average price of $193 per acre. The location of the sale tracts is shown in Figure 1. The acreage sold in the 32 tracts represents four percent of the total land in farms in Miller Township.

### Characteristics of the Land Affecting the Bid Price Per Acre

The high productivity of the area was one of the primary reasons the area of the study was selected by the Ponca Indians for their reservation. Sixty years later, productivity of the land remains an important factor in the mind of any prospective purchaser. Some of the factors studied which measure productivity are average wheat yield, predominant land class and percent cropland.

The size of the tracts sold varied from 10 acres to a maximum of 120 acres. Bidders apparently did not consider the size of the tract as a price determining factor (Table 1). A 10-acre tract brought $256.00 an acre, the same price per acre as one containing 80 acres. None of the tracts sold was large enough to be considered as a family farm unit. This may have influenced potential "beginning" farm purchasers not to enter the market in this area. Size of tract as a deterrent to bidding would logically be somewhat less important to farmers interested in

TABLE I

RELATIONSHIP OF THE PRICE BID PER ACRE AND SELECTED FACTORS FOR 32 TRACTS BY 76 BIDDERS INDIAN LAND SALES, MILLER TOWNSHIP, KAY COUNTY, OKLAHOMA, 1956-1958

| Item | Bid Price Per Acre | | |
|---|---|---|---|
| | Less than $150 | $150 - $214 | Greater than $215 |
| Number of bids | 22 | 33 | 21 |
| Average bid per acre | 121.35 | 182.07 | 226.10 |
| Average acres per tract | 55.9 | 68.0 | 50.0 |
| Average wheat allotment (acres) | 25.4 | 32 | 22.4 |
| Average wheat yield (bu.) | 20.1 | 21 | 25.5 |
| Average distance from present operations (miles) | 1.48 | 1.23 | .26 |
| Average size of operation of bidder (acres) | 640.9 | 709.1 | 691.4 |
| Average acres cropland | 50.3 | 65.0 | 50 |
| Percent cropland | 89 | 95 | 100 |
| Predominant land class | 3 | 2 | 1 |
| Size of tract | 55.9 | 68 | 50 |

expansion of their present units than it would to prospective farmers who would be wholly dependent on the particular limited acreage. There was no assurance of additional acreages being available to add to any of the tracts that a bidder might purchase.

The percentage of cropland of a tract apparently had an influence on bid price per acre (Table II). Tracts containing less than 70 percent cropland, commanded an average bid price of $95 per acre, compared with a bid price of $185 per acre for tracts containing 90 to 100 percent cropland. Of the successful bids, an average price of $255 per acre was paid for 100 percent cropland, and $140 per acre was paid for tracts containing an average of 87 percent cropland.

The predominant land class was a factor affecting price (Table III). Due to the homogeneity of the land in this township it was possible to classify the land and obtain the acreages of each class from Soil Conservation Service maps. Only one tract had more than two land classes and all tracts were rated according to the one class predominating. Class 1 land, which is land with no farming hazards present, had an average bid price of $190 per acre, class 2 land with one hazard had an average bid of $164 per acre and class 3 with 2 hazards had an average bid of $140 per acre.

All of the mineral rights were sold with the tracts, so no measurements of bidders' evaluations of this factor were obtained. Forty-seven percent of the tracts had an existing oil and gas lease but no differences in price due to such leases were observed.

The average wheat yield apparently had little influence on the bid price (Table I). The deep soil and its fast response to improved farming

TABLE II

RELATIONSHIP OF PERCENT CROPLAND ON SELECTED FACTORS FOR 32 TRACTS BY 76 BIDDERS, INDIAN LAND SALES, MILLER TOWNSHIP, KAY COUNTY, OKLAHOMA, 1956-1958

| Item | Percentage of Cropland | | | |
|---|---|---|---|---|
| | 0-69 | 70-79 | 80-89 | 90-100 |
| Average price per acre (dollars) | 95.00 | 143.25 | 189.00 | 184.90 |
| Average size of tract (acres) | 46 | 60 | 120 | 57.3 |
| Average acres cropland (acres) | 22 | 45 | 100 | 56.9 |
| Average wheat yield (bushels) | 20 | 16.5 | 25 | 22.2 |
| Average distance from present operation (miles) | .3 | 0 | .33 | 1.15 |
| Average size of present operation (acres) | 163 | 690 | 893 | 631 |
| Number items | 4 | 4 | 3 | 66 |

TABLE III

RELATIONSHIP OF PREDOMINANT LAND CLASS AND SELECTED FACTORS FOR 32 TRACTS BY 76 BIDDERS, INDIAN LAND SALES, MILLER TOWNSHIP, KAY COUNTY, OKLAHOMA, 1956-1958

| Item | Land Class 1 | 2 | 3 |
|---|---|---|---|
| Average price per acre | 190.42 | 164.70 | 140.00 |
| Average acres in tract | 56.4 | 68.7 | 57.1 |
| Average cropland in tract (acres) | 54.6 | 64.6 | 49.1 |
| Average acres of land class | 46.1 | 65.1 | 50.8 |
| Average wheat yield (bushels) | 24.9 | 16.8 | 15 |
| Average acres wheat allotment | 25.5 | 33 | 25.8 |
| Average distance from present operation (miles) | .76 | 1.94 | .5 |
| Average size of present operation (acres) | 708 | 629 | 662 |
| Number of observations | 50 | 19 | 7 |

practices may have influenced bidders to discount historical yields in favor of knowledge of how improved technology could increase yields in this area.

It was hypothesized that the acres of alloted crops would have a pronounced influence on bid price per acre (Table I). Studies in other areas have indicated a significant influence of this factor.[13] No significant differences in bid prices were found by studying the average alloted acres per tract in this area. One eighty acre tract selling for over $20,000 had no wheat allotment; a forty acre tract with seven acres allotment brought $8,600. Similar instances indicated bidders were considering other factors, such as how the tract would fit with their present unit.

Each tract sold by the Bureau of Indian Affairs is sold subject to the existing agricultural lease of from 0 to 5 years with the rentals going to the purchaser on the first anniversary date occurring after the sale. No provisions are made for lease cancellations. The data were examined for evidence that a person might place a lower evaluation on tracts subject to a long term lease (Table IX, Appendix). No evidence of a relationship between prices bid and the years remaining of an agricultural lease were observed in this study. This may indicate that persons are reluctant to bid on a tract if there is a long term lease held by another person.

The high productive capacity of the soils in this township is reflected in the data. The average wheat yield of all tracts sold was 22 bushels per acre. The predominant land class was class 1 in 20 tracts

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[13] Billy Stewart, op. cit. p. 22.

and an average class of 1.5 for all tracts sold. The average allotment base obtained from the ASC office for wheat in this township is 85 percent of the total farm cropland acreage.* This indicates that during periods of no controls and good prices nearly all cropland in the area is planted to high profit cash crops with only small acreages for hay, silage, legumes, oats and other minor crops.

Figure 2 shows how the average yield of wheat in Kay County has exhibited an upward trend since World War II. The data represented in the figure are considered to be a conservative estimate of yields in Miller Township.

## Characteristics of the Bidder Affecting the Bid Price Per Acre

Historically, land values have followed the trends in net farm income, with but few exceptions. Since World War II, land values have increased as farm income increased. This pressure has resulted in land prices above the 1920 peak. The upward trend was halted in 1951 with the downturn of farm commodity prices, and continued downward until 1954. (The major commodity produced in this area was wheat and the trend in wheat prices is represented in Figure 3). Then, land values turned upward even though farm income continued to decline. This upward trend in land prices has continued, making it the longest period where land values have moved counter to farm income in the 40 year period during which the United States Department of Agriculture has kept records.

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*The wheat allotment for a tract would be the acreage reduction factor times the allotment base for the tract.

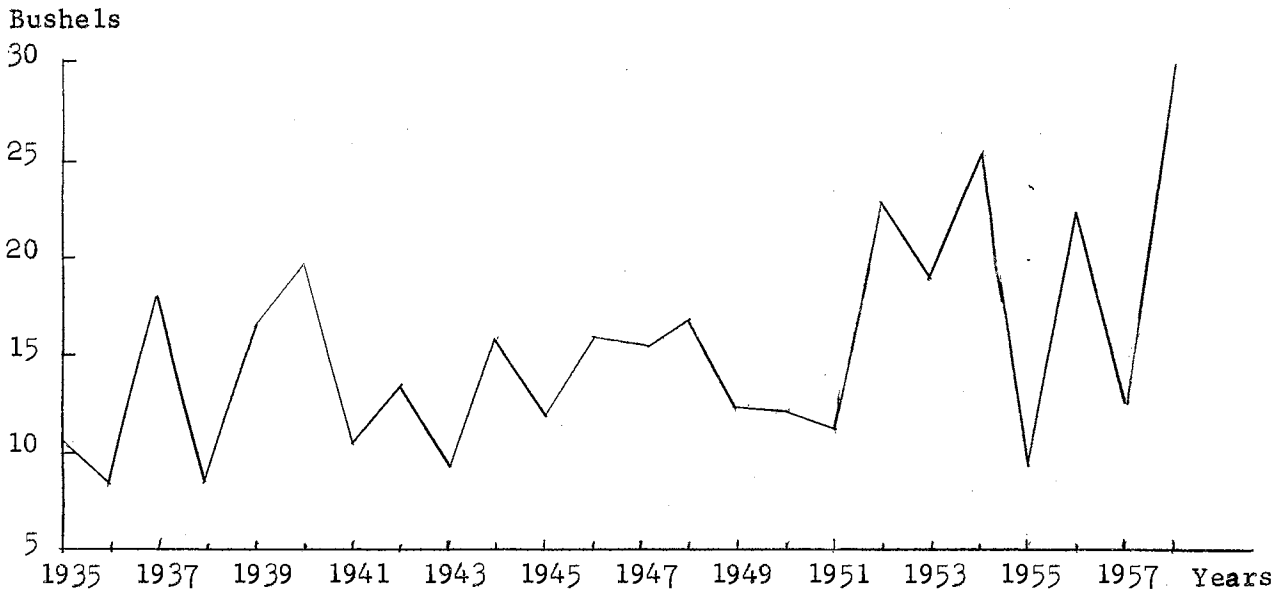


Figure 2. Kay County Average Wheat Yields, 1935-1958


Figure 3. Wheat: Average Prices Received by Oklahoma Farmers, 1930-1957

[a]Preliminary estimate.

Source: U.S.D.A. Agricultural Marketing Service.

Much of the explanation for rising land prices in spite of declining farm income lies in advancing technology and the non-farm sector of the economy.

> "Demand among farmers has been sustained partly by the desire of present operators to enlarge their farms. Many thousands of farmers who wanted to realize the full benefits of farm mechanization and other advances in agriculture felt the need for more land. Reduced prices for farm products after 1951 were not accompanied by reductions in the cost of the things farmers buy. This squeeze between costs and prices received encouraged a faster adoption of improved fertilizer and seed, more efficient feeds, better breeding practices and more efficient management without increasing the acreage. But many farmers found that they needed more land to use efficiently the labor and equipment they had. Some machines are profitable only if the initial cost and annual depreciation can be distributed over a large total output."[14]

The pressures for farm enlargement and non-farm pressures were evaluated in this study since all persons bidding and their "firm" bids were known. Tables and correlation studies were made on the price per acre offered, amount of bid, the distance from a bidder's present operation, the size of operation, whether an increase or maintenance of the present operation was contemplated or a beginning farm owner, who held the present agricultural lease, and the major occupation of the bidder.

Some relationship is shown between price per acre and distance from the present operation (Table I). Bidders apparently were willing to pay more for farm land adjacent to their operation. An average of $187 per acre was bid for adjacent tracts, compared with an average of $143 per acre acre for land over 6 miles from present operations. An interesting point of study in the correlation charts indicates that bidders were

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[14] Paul, Holm, and William H. Scofield, "The Market for Farm Real Estate", Land, The Yearbook of Agriculture, Washington, D. C., 1958, p. 200.

willing to pay more for a tract adjacent to them with very little attention given to its predominant land class or productive capacity. Persons interviewed expressed the feeling that the efficiency of their present operation would be increased even though most machinery and equipment is highly mobile and more productive land is available at a greater distance.

Smaller operators of 320 acres or less who bid on land were located an average of 1.7 miles from the tract selling. Larger operators of 1,000 or more acres bid on tracts averaging .5 mile from their present operation (Table IV). This may indicate the pressure on small operators for farm expansion to improve efficiency and maintain farm income in the face of declining agricultural prices. The smaller operator in this area is apparently more willing to go a greater distance to increase his farm size rather than wait for an adjacent tract to sell.

The size of the present operation of each bidder was examined for possible relation with the price bid and other factors. No significant differences were detected between bids submitted by small operators (320 acres or smaller) and larger operators (over 1,000 acres) with respect to bid price.

It should be noted that 60 percent of the larger operators who bid were farming the tract on which they were bidding while only 13 percent of the small operators who bid held the lease. Larger operators bid mostly on land they were already farming or which was adjacent to their present operation.

The bidders in this study were classified in Table VII of the Appendix as active farmers, retired farmers, businessmen, professional (doctor,

TABLE IV

RELATIONSHIP OF PRESENT SIZE OF OPERATION OF A BIDDER AND SELECTED FACTORS, INDIAN LAND SALES, MILLER TOWNSHIP, KAY COUNTY, OKLAHOMA, 1956-1958

| Item | Size of Present Operation | | |
|---|---|---|---|
| | 0-320 | 321-999 | over 1000 |
| Number of bids | 31 | 20 | 25 |
| Average bid per acre | 174.00 | 187.00 | 178.00 |
| Average acres per tract | 56.9 | 62.5 | 59 |
| Average acres cropland | 55.4 | 61 | 55 |
| Average wheat allotment (acres) | 27.4 | 27.5 | 22 |
| Average wheat yield (bushels) | 22.6 | 21.4 | 27 |
| Percent of bidders holding present lease | 12.9 | 15 | 46 |
| Average years of lease remaining | 2.6 | 1.9 | 2.2 |
| Average distance from present operation (miles) | 1.7 | .75 | .5 |
| Average size of operation (acres) | 127.7 | 522 | 1450 |

dentist, lawyer or teacher) or craftsmen (carpenter, welder, etc.). Over 68 percent of the bids received were from farmers. A majority of the bids received were for farm enlargement or to maintain the size of the present unit. Only four of the bids received were beginning farmer or new operator bids. The percent cropland of a tract had an influence on whether an outside bidder was interested in a tract. The non-farmer group bid only on tracts containing nearly all cropland. This may be explained by the fact that the area under study is a cash crop area with very little livestock. Pasture land or wooded areas would entail considerable additional development costs not present in tracts all farmland.

# CHAPTER IV

## STATISTICAL ANALYSIS OF DATA

A correlation analysis was made in order to measure the interdependence of the factors studied. All bids received and the 32 successful bids were studied with particular emphasis on the relationship of the various factors to the bid price per acre (Table V and Table VI). In the group of all bids received (Table V), only 3 factors were statistically significant while in the 32 successful bids group (Table VI), 7 factors gave evidence of significant correlation with bid price per acre. This would be expected because as bidders increased their bids they would be giving careful analysis to more factors. The factors were grouped according to characteristics of the land and characteristics of the bidder.

### Characteristics of the Land

The percent cropland and land class showed higher correlations with price per acre than other factors considered. These two factors reflect potential productivity of land. It should be noted that average wheat yields and acreage allotments had little or no correlation with price in Table V while in the successful bids (Table VI), wheat yields did have a significant correlation.

The adaptability of the area to crops is shown by the high correlation of acres of cropland and acres in the tracts. Nearly all of the land sold was in cropland with very little pasture or waste land. The wheat allotment was highly correlated with both the acres cropland and acres in the

TABLE V

SIMPLE CORRELATIONS BETWEEN SELECTED FACTORS FOR 32 TRACTS BY 76 BIDDERS INDIAN LAND SALES, 1956-58

| | Price per Acre $X_1$ | Acres $X_2$ | Acres Cropland $X_3$ | Percent Cropland $X_4$ | Years Lease Remaining $X_5$ | Average Wheat Yield $X_6$ | Acres Wheat Allotment $X_7$ | Distance from Present Operation $X_8$ | Increase, Maintain, or Beginning Bid $X_9$ | Holds Present Lease $X_{10}$ | Occupation of Bidder $X_{11}$ | Present Size of Operation $X_{12}$ | Predominant Land Class $X_{13}$ | Oil Lease $X_{14}$ | Purchase for Production $X_{15}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Price per Acre $X_1$ | 1.000 | -.0661 | .02228 | .4025** | -.077116 | -.0231 | -.07107 | -.1765* | .03989 | -.04679 | -.012686 | .02618 | -.3433** | .04259 | -.01414 |
| Acres in Tract $X_2$ | | 1.000 | .96037 | -.06555 | -.31567 | -.12947 | .53667 | .10755 | .1184 | .00296 | .00846 | -.035856 | .11064 | .036868 | -.15258 |
| Acres Cropland $X_3$ | | | 1.000 | .1857 | -.33378 | -.11263 | .53056 | .1528 | .1007 | .046003 | .06761 | -.1025 | .038467 | .03823 | -.1257 |
| Percent Cropland $X_4$ | | | | 1.000 | .059656 | .07854 | .07733 | .12946 | -.042167 | .22697 | .1984 | -.27689 | -.33259 | -.07677 | .14797 |
| Years Agricultural Lease Remaining $X_5$ | | | | | 1.000 | -.094327 | -.12319 | .07092 | .03938 | -.001333 | .14244 | -.04417 | -.2570 | -.16738 | .33153 |
| Average Wheat Yield $X_6$ | | | | | | 1.000 | -.19623 | .01074 | -.07667 | .060828 | -.04279 | .11043 | -.08735 | -.11949 | .001326 |
| Acres Wheat Allotment $X_7$ | | | | | | | 1.000 | .02453 | .16549 | -.07064 | -.003603 | -.01933 | .10636 | -.03996 | -.1223 |
| Distance from Present Operation $X_8$ | | | | | | | | 1.000 | .12278 | .2345 | .14418 | -.2669 | .08648 | -.1518 | .3586 |
| Increase, Maintain, or Beginning Bid $X_9$ | | | | | | | | | 1.000 | -.57557 | -.13931 | .04985 | -.10035 | .06874 | .07255 |
| Holds Present Lease $X_{10}$ | | | | | | | | | | 1.000 | .3065 | -.3869 | .06653 | -.2642 | .2685 |
| Occupation of Bidder $X_{11}$ | | | | | | | | | | | 1.000 | -.4495 | -.06283 | -.11279 | .5510 |
| Present Size of Operation $X_{12}$ | | | | | | | | | | | | 1.000 | -.04214 | .1885 | -.394148 |
| Predominant Land Class $X_{13}$ | | | | | | | | | | | | | 1.000 | -.00794 | -.1068 |
| Oil Lease $X_{14}$ | | | | | | | | | | | | | | 1.000 | -.1670 |
| Purchase for Production $X_{15}$ | | | | | | | | | | | | | | | 1.000 |

TABLE VI

SIMPLE CORRELATIONS BETWEEN SELECTED FACTORS FOR 32 SUCCESSFUL BIDDERS, INDIAN LAND SALES, 1956-58

| | Price per Acre | Total Acres | Acres Crop-land | Percent Crop-land | Years Lease Remain-ing | Average Wheat Yield | Acres Wheat Allot-ment | Distance from Present Opera-tion | Increase, Maintain, or Begin-ning Bid | Holds Present Lease | Occupation of Bidder | Present Size of Opera-tion | Predominant Land Class | Oil Lease | Purchased for Production |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | $X_6$ | $X_7$ | $X_8$ | $X_9$ | $X_{10}$ | $X_{11}$ | $X_{12}$ | $X_{13}$ | $X_{14}$ | $X_{15}$ |
| Price per Acre $X_1$ | 1.00 | .02250 | .2057 | .61087** | -.007556 | .4146* | .04085 | -.1066 | -.05113 | .000481 | -.1057 | -.1371 | -.436018* | -.0478 | -.10077 |
| Acres in Tract $X_2$ | | 1.00 | .9345 | .01415 | -.13701 | -.1496 | .62298 | .22009 | .2025 | -.02196 | .09744 | -.1298 | .1027 | -.1286 | .04923 |
| Acres Cropland $X_3$ | | | 1.00 | .3346 | -.15259 | -.08382 | .6692 | .2651 | .28953 | -.02487 | .1658 | -.2213 | -.01652 | -.1416 | .11677 |
| Percent Cropland $X_4$ | | | | 1.00 | .09148 | .1359 | .2709 | .1003 | .1860 | .09189 | .17155 | -.3254 | -.3616 | -.13919 | .1739 |
| Years Agricultural Lease Remaining $X_5$ | | | | | 1.00 | .08551 | -.005044 | .02484 | .007258 | .02374 | .3219 | .11639 | -.1850 | -.13625 | .31082 |
| Average Wheat Yield $X_6$ | | | | | | 1.00 | -.3904 | -.1839 | -.03744 | -.14394 | -.04223 | .1556 | -.5596 | -.1599 | -.09494 |
| Acres Wheat Allotment $X_7$ | | | | | | | 1.00 | .2044 | .2312 | -.09825 | -.012688 | -.07574 | -.01409 | -.0294 | .009021 |
| Distance from Present Operation $X_8$ | | | | | | | | 1.00 | .3668 | .2786 | .2327 | -.3485 | .2101 | -.23227 | .53646 |
| Increase, Maintain, or Beginning Bid $X_9$ | | | | | | | | | 1.00 | -.5718 | -.010429 | .1051 | -.21764 | .1606 | .2714 |
| Holds Present Lease $X_{10}$ | | | | | | | | | | 1.00 | .3501 | -.4583 | .30996 | -.4980 | .3550 |
| Occupation of Bidder $X_{11}$ | | | | | | | | | | | 1.00 | -.3865 | .07181 | -.3501 | .4738 |
| Present Size of Operation $X_{12}$ | | | | | | | | | | | | 1.00 | -.1655 | .2951 | -.2983 |
| Predominant Land Class $X_{13}$ | | | | | | | | | | | | | 1.00 | .04428 | .13363 |
| Oil Lease $X_{14}$ | | | | | | | | | | | | | | 1.00 | -.3550 |
| Purchased for Production $X_{15}$ | | | | | | | | | | | | | | | 1.00 |

tracts. This would indicate that during periods of no acreage controls nearly every acre of cropland would be planted to wheat with the exception of the acreages of legume crops required on each tract by the Bureau of Indian Affairs.

The land class of a tract is correlated with the percent cropland as shown in both Tables V and VI. The definition of the various land classes would suggest this correlation. Every acre of class 1 land is suitable for cultivation, class 2 has 1 hazard, class 3 has 2 hazards, and class 4 is suitable for cultivation only 1 year in 5.

In Table VI, the relationship between land class and the distance from the successful bidders present operation is indicated. The positive correlation, indicates that good land close to the bidders present operation was definitely more desirable from the standpoint of the successful bidder.

Negative results were obtained by studying whether an oil lease was on the property. All of the tracts sold included all the royalty rights to oil and minerals. An oil lease on a tract gives little indication of whether oil is present or not. It is a permit to prospect for oil and, if found in paying quantities, to produce from the lease and pay the usual 1/8 royalty to the owner of the mineral rights.

The years of agricultural lease remaining on the tract apparently has little effect on the bid price per acre. The successful bidders were apparently more interested in its potential production and how it would fit with their units. This would indicate that little or no discount was made for a lease up to 5 years in length on the tracts sold.

## Characteristics of the Bidder

In Tables V and VI, only one characteristic of the bidders, distance from the present operation, showed correlation with bid price per acre. In both tables, the effect of distance was about equal. Since location is fixed, changes in farm technology, or other production practices of individual purchasers could have little effect on this factor. It is shown that the difference in bid price of the successful bidders, as well as all bids, is accounted for by factors other than location.

In the analysis of the effect of distance from the present operation and other factors, a negative correlation with size of operation is noted. This indicates larger operators were reluctant to bid on tracts distantly located with respect to their present operation.

Table V indicates no relationship between the present size of a bidders operation and bid price per acre. This suggests that a small operator would bid as much per acre as the large operator. In Table VI a small negative correlation is shown, indicating that smaller operators were bidding enough more to be the successful bidder in a larger percent of the cases. An explanation of part of this difference can be explained by another part of the tables. A negative correlation between size of the operation and whether the bidder held the present farm lease is shown in both tables. As the size of operation increases, the bidder is more likely to hold the agricultural lease on land that he bids on.

There appears to be little correlation between the occupation of the bidder and the price per acre. Farmers and non-farmers apparently were willing to bid about the same for land. The relationship between the

occupation of the bidder and whether the bidder held the present lease is indicated in both Table V and VI. A person already farming a tract, regardless of his occupation, would tend to bid higher on a tract than would other persons. Since most of the bidders in this study were farmers, this relationship would be expected.

Using the 76 bids, a study of the factors relating to expansion of a farm unit, whether the bid was a beginning farmer bid, a bid to increase farm size or to maintain size, gave no indication of any relationships. No significant correlations between bid price per acre and the expansion factors were indicated in either table. In Table VI, which shows the successful bids, correlations are shown between the increase in size and the production factors, acres in tract, acres cropland, acres of wheat allotment, and distance from the present operation. This would indicate that the successful bidders were evaluating the above factors more carefully than the average of all the bidders.

## Regression Analysis

Regression equations were fitted to the offers of the 76 bidders and to the 32 successful bids. Obviously, the offers of the unsuccessful bidders had no direct effect on the final price. However, the unsuccessful bids may have played an important part in price determination in that they may have influenced bidders to offer a price representing the maximum value of the land to the individual. The differences in the bids of the 76 bidders and the 32 successful bidders would represent the differences in the values of the tracts to the individuals.

All 76 bids received were used in the first regression study so that factors which actually had an effect on the bid price of different persons could be evaluated. These data are unique in that they reflect the value attached by different individuals to a given tract of land. When final contract prices only are used, no measure of the range of effective offers is available. Location, distance, yields or any of the other factors significant in the correlation analysis would be expected to explain most of the variation in the price per acre ($R^2$). If these characteristics were actually influential in determining value to the prospective purchaser, the study of all 76 bids submitted would be expected to give more weight to those factors that are significant than a study of only the 32 successful bidders.

Six different algebraic forms of equations (statistical models) were fitted to the data for the 76 bidders. The factors used in the equations were those showing the largest simple correlations with bid price per acre. These were percent cropland ($X_1$), distance from the operator's present operation ($X_2$), and land class ($X_3$). These six equations were then examined for consistency with expected relationships. The Cobb-Douglas equation, $Y = b_o X_1^{b_1} X_2^{b_2} X_3^{b_3}$, and the square root equation, $Y = b_o + b_1\sqrt{X_1} + b_2\sqrt{X_2} + b_3\sqrt{X_3}$, were both consistent with the economic model and reflected complementarity of factors.

The $t_{b_i}$ and the $R^2$ values were the statistical criteria used to determine goodness of fit of the various equations. The $t_{b_i}$ is the symbol for the student "t-test" of the $b_i$ values. This is a test to determine whether the $b_i$ values are significantly different from zero at a given probability level. The symbol $R^2$ refers to the coefficient of

determination and is the fraction of variation attributable to regression.[15] The size of the $R^2$ indicates how well a given equation fits the available data, or measures the goodness of fit. The statistical test is based primarily on the size of the $R^2$, once the significance of the $b_i$ values have been determined. The closeness of fit is improved as the $R^2$ value approaches 1. If $R^2 = 1.0$, the equation would characterize the data perfectly and the equation would pass through every observed point.

The primary objective of the regression analysis was to determine the relationship between the 3 factors and the bid price per acre. That is, we wished to know the manner or degree that percent cropland, distance, and land class, are connected with the bid price per acre.

The $R^2$ values of each of the equations were low, varying from .2269 to .303. Thus, the variables considered explain only 22 percent to 30 percent of the variations present in all of the bids submitted. The square root equation, which was selected for predictive purpose, had an $R^2$ of .2612 with two "b" values significant at the 5 percent level compared to the Cobb-Douglas equation with one significant "b" value (see Table XI, Appendix).

The $R^2$ of the square root equation was small, explaining only 26 percent of the variation present in the bid price per acre. The unexplained variation may be random variation or it may be due of other independent variables not considered in the regression equation.[16] Individual bidders

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[15] George W. Snedecor, Statistical Methods, Iowa State College Press, Ames, Iowa, fifth edition, 1956, p. 420.

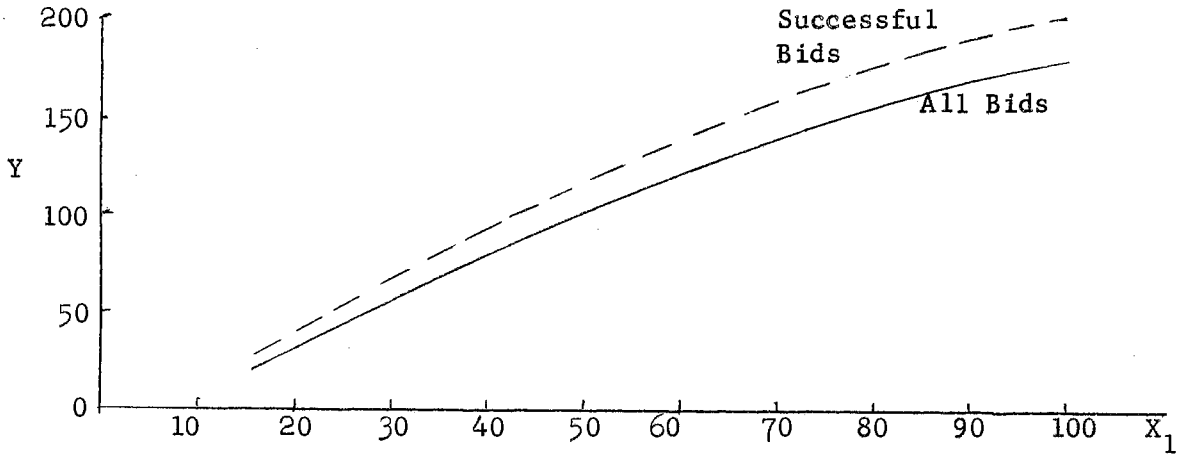
[16] Ibid. p. 438.

may have placed different valuations on the various factors. Independent variables not considered involve the human or individual element which makes them difficult to measure quantitatively. These would include pride of ownership, individual ambitions, the variation in the intended use among the different bidders, and the potential change in net income of the bidder.

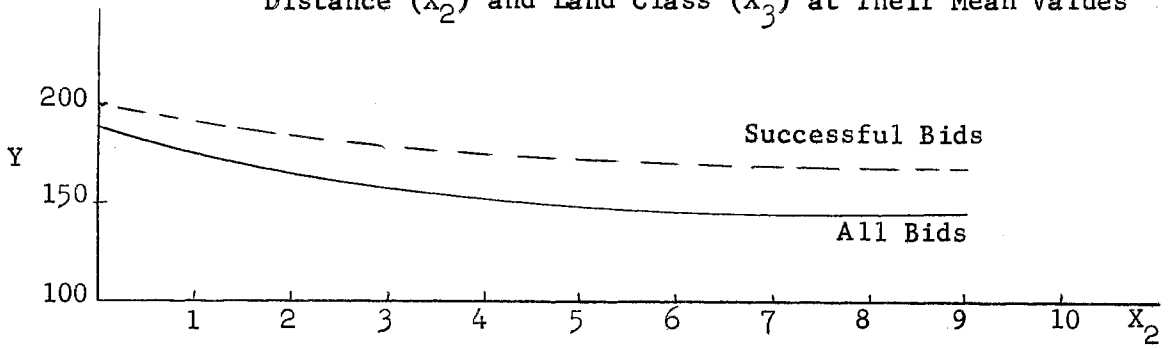
The partial regression equations are plotted in Figure 4. The relationship of the bid price per acre and each factor, holding the other two factors constant at their mean values is shown. Part 1 of Figure 4 shows the relationship of percentage of cropland and price per acre while fixing distance at its mean value of .84 mile and land class at its mean value of 1.5. The chart shows that a tract with 100 percent cropland would have a predicted bid price of $178.80 per acre, while a tract containing 50 percent cropland would have a predicted bid price of $101.00 per acre.

In part 2 of Figure 4, the percent cropland is fixed at its mean value of 94.6 percent, along with land class at 1.5, and the distance of a tract from the operator's present operation was varied. Predictions of the change in bid price per acre were that a tract 1 mile distant from the present operation would bring $173 per acre compared with a predicted price of $159 per acre on tracts 4 miles from a bidder's present operation.

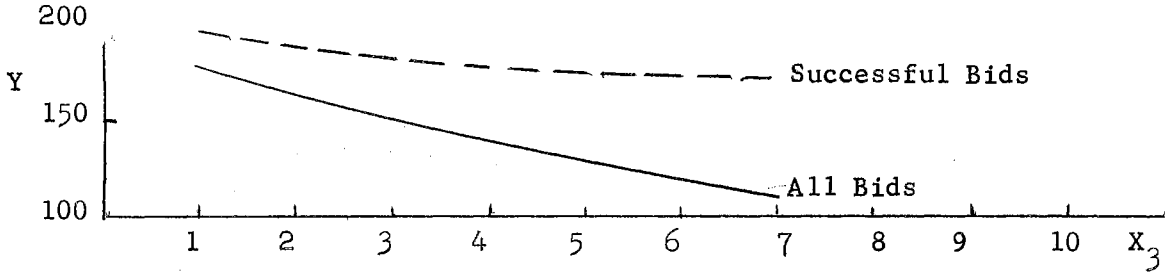
The result of fixing percent cropland and distance at their mean values and varying land class are plotted in Part 3. A tract of class 2 land could be predicted to bring $163 per acre compared with an expected $140 per acre bid on class 4 land. This small variation may be another




Part I. Relation of Land Price per Acre (Y) and Percent Cropland with Distance ($X_2$) and Land Class ($X_3$) at Their Mean Values




Part II. Relation of Land Price per Acre (Y) and Land Class ($X_3$) with Percent Cropland ($X_1$) and Distance ($X_2$) at Their Mean Values




Part III. Relation of Land Price per Acre (Y) and Distance ($X_2$) With Percent Cropland ($X_1$) and Land Class ($X_3$) at Their Mean Values

Figure 4. The Relation of Land Price Per Acre (Y) and Percent Cropland ($X_1$), Distance ($X_2$) and Land Class ($X_3$)

indicator of the productive potential of all the various land classes irrespective of the physical hazards present on the tract.

An examination of Figure 4 indicates that the percentage of cropland would be the best single indicator of bid price per acre. The distance and land class factors explained very little variations in bid price per acre.

A regression study was made of the 32 successful bids using the factors showing the largest simple correlations with bid price per acre (Table VI). Since the square root equation was used in the analysis of the 76 bids, it was also used for the successful bids group. The $R^2$ obtained explained 58 percent of the variation present in the actual purchaser group. It is noteworthy that the $R^2$ for the regression related to the 32 successful bids is considerably higher than for the 76 bids. This difference arises from the fact that even in a homogenous area, such as the area of the study, there are larger differences in the value to different individuals of a given tract. These differences might be attributed to differences in managerial ability, capital position, urgency of adding land to the unit, and errors in estimating values. The variables used were percent cropland, distance, predominant land classes, acres cropland, size of operation, occupation and average wheat yields. The relationship of the first three factors to selling price was plotted in Figure 4 to show how successful bidders were evaluating these factors compared with all bidders. The successful bidders were placing higher evaluations on the three factors plotted and were more critical of the four additional factors showing larger simple correlations than all bidders in the study.

# CHAPTER V

## SUMMARY AND CONCLUSIONS

The purpose of this thesis was to identify and evaluate the major factors influencing the sealed bids for Indian land in Miller Township. Historically, land prices have moved in the same direction as farm income, but this has not been the case since 1954. Farm income has declined since 1954 and land values have increased during the same period. This trend is contrary to the methods of determining valuation in the generally accepted theory of value.

A detailed study was undertaken of the demand for this farm land and the factors that influenced each potential purchaser's bid. Ten percent of the offered price accompanied every sealed bid so each bid was considered a "firm" offer to purchase. The period of bids covered by this study was from May 1956 to May 1958 and included 8 widely advertised land sales by the Bureau of Indian Affairs.

The data indicated a definite trend toward larger farms. Only 4 bids were submitted by persons entering the farm real estate market for their initial purchase. Only three identifiable factors were consistently important in determining the price which a potential purchaser was willing to pay. These are the percentage cropland, distance of a tract from the bidder's present operation, and the predominant land class. Two of the factors, percentage of cropland and predominant land class, were characteristics of the land and reflect the potential productivity of the tracts.

The percentage of cropland in a tract reflects the potential use of a tract in high profit cash crops. Potential buyers considered the larger number of acres in cultivation the most important of the factors studied. Non-cultivated land would have to be utilized as pasture, woodlot, or unproductive waste land.

Essentially all of the land area suitable for cultivation in the area studied is in cultivation. The land class of a tract would naturally be associated with a higher price per acre. The definition of the various land classes by the Soil Conservation Service would explain why class 1 land would be the type of land most desirable to a potential purchaser. Class 1 land is defined as land suitable for cultivation with no physical hazards present. The other land classes have various hazards present making them suitable for less intensive uses for cash crops or other agricultural production.

The historical average wheat yields of a tract apparently were not considered to be important by most bidders. The deep soil and its fast response to improved farming practices apparently influenced bidders to discount historical yields in favor of knowledge of how improved technology would increase yields in the area studied.

The distance from a bidder's present farm operation was the third factor consistent in determining the amount bid by a potential purchaser. Bidders are apparently willing to pay more for a tract adjacent to them with relatively little attention given to its predominant land class or historical yield data. The efficiency of the present unit would be increased in most cases by such factors as less moving time with equipment, better utilization of small grain pasture and waste land by livestock, and more efficient layout of cultivated fields.

The successful bidder group was studied for the factors common to the actual purchasers of the tracts. There were seven factors reflecting both characteristics of the land and characteristics of the bidder. The acres of cropland, percentage of cropland, average wheat yield and predominant land class were land characteristics explaining the variation in the successful bids. The occupation of the bidder, distance from his present operation and the size of his operation were characteristics of the bidder explaining variation of the top bids.

The unexplained variation in the demand for this farm land can be attributed to the human element in other factors affecting the value of farm land. These factors would include individual ambitions, pride of ownership, the variation of the intended use among potential purchasers, and the changes which an additional acreage would make in net income of the purchaser.

The intended use would be closely associated with the marginal value of product that the tract would add to a purchaser's present unit. If the additional land in its intended use would add more to net income, a potential purchaser would bid more than a person interested in using a tract for pasture purposes or less intensive uses.

The use of new varieties, larger and more efficient equipment, fertilizer, insecticides, and improved soil management practices is reflected in steadily increasing yields. Despite the decline in farm prices, the increase in the output of cash crops due to improved technology may have more than offset the price reduction. This may explain the tendency of farm purchasers to continue to bid up land prices even though the prices

of farm products have declined. The farmer utilizing improved technology would be able to bid more per acre because his potential yields would be more than those of other bidders using outmoded practices.

# BIBLIOGRAPHY


Bishop, C. E. and W. D. Toussaint, Introduction to Agricultural Economic Analysis, John Wiley and Sons, New York, 1958.

Collins, Geoffrey P., "Lecture Notes in Agricultural Finance", Oklahoma State University, 1958.

Heady, Earl O., Economics of Agricultural Production and Resource Use, Prentice-Hall, New Jersey, 1952.

Holm, Paul and William H. Scofield, "The Market for Farm Real Estate", Land, The Yearbook of Agriculture, United States Department of Agriculture, Washington D. C., 1958.

Larson, Adlowe L., Agricultural Marketing, Prentice-Hall, New York, 1951.

Leftwich, Richard H., The Price System and Resource Allocation, Rinehart and Company, New York, 1955.

Muchmore, Gareth, "Ponca Indians Have Strong Link to Area History", Ponca City News, September 16, 1955.

Scofield, William H., "How Do you Put a Value on Land?" Land, The Yearbook of Agriculture, United States Department of Agriculture, Washington D. C., 1958.

Snedecor, George W., Statistical Methods, Iowa State College Press, Iowa, 1956.

Stewart, Billy H., Analysis of the Farm Real Estate Market in Beckham and Garfield Counties, Unpublished Masters Thesis, Oklahoma State University, 1958.

Wallace, Henry A., "Comparative Farm Values in Iowa", Journal of Land and Public Utility Economics, Volume II, No. 4, October, 1926.

# A P P E N D I C E S

TABLE VII

THE RELATIONSHIP OF VARIOUS SELECTED FACTORS AND OCCUPATION OF BIDDERS, 76 BIDS ON 32 TRACTS, MILLER TOWNSHIP, KAY COUNTY, OKLAHOMA, 1956-58

| Item | Occupation | | | | Retired Farmer |
|---|---|---|---|---|---|
| | Farmer | Professional | Business | Craftsman | |
| Average price per acre (dollars) | 182.00 | 172.00 | 147.00 | 181.00 | 187.00 |
| Average size of tract (acres) | 58.2 | 66.2 | 65 | 66 | 55 |
| Average acres cropland | 54.5 | 63.5 | 65 | 66 | 55 |
| Average wheat yield | 21.7 | 22.7 | 18.7 | 25 | 23.1 |
| Average wheat allotment | 27.2 | 29 | 31.5 | 20 | 28 |
| Average distance from present operation (miles) | .5 | 2.8 | 4.0 | 2.6 | .37 |
| Average size of present operation (acres) | 935.7 | 70 | 130 | 26 | 265 |
| Percent cropland | 90.3 | 96.8 | 100 | 100 | 100 |
| Number of items | 52 | 9 | 4 | 3 | 8 |
| Percent number of bids | 68 | | | | 9 |

TABLE VIII

RELATIONSHIP OF DISTANCE OF TRACT FROM PRESENT OPERATION TO BID PRICE AND OTHER FACTORS, 76 BIDS ON 32 TRACTS, MILLER TOWNSHIP, KAY COUNTY, OKLAHOMA, 1956-58

| Item | Distance from Present Operation | | | |
|---|---|---|---|---|
| | 0 | .5-1 | 1.5-5 | 6-15 |
| Number of Bids | 46 | 14 | 14 | 2 |
| Average bid per acre (dollars) | 187.93 | 171.92 | 163.78 | 143.5 |
| Average acres per tract | 56.5 | 62.8 | 66.8 | 55 |
| Average acres cropland | 53.7 | 56.1 | 66.8 | 55 |
| Average wheat allotment (acres) | 27.4 | 26.9 | 27.8 | 28.5 |
| Average wheat yield (bushels) | 22.6 | 20.3 | 21.4 | 22.5 |
| Average size of operation of bidder (acres) | 840 | 462.8 | 492 | 0 |
| Average years of lease remaining | 2.3 | 2.3 | 2.0 | 4 |
| Average distance from present operation (miles) | 0 | .785 | 3 | 12.5 |

TABLE IX

THE RELATIONSHIP OF VARIOUS FACTORS AND YEARS OF AGRICULTURAL LEASE REMAINING, 76 BIDS ON 32 TRACTS, MILLER TOWNSHIP, KAY COUNTY, OKLAHOMA, 1956-58

| Item | | | | | | |
|---|---|---|---|---|---|---|
| Years of lease remaining | 0 | 1 | 2 | 3 | 4 | 5 |
| Average price per acre (dollars) | 170.00 | 212.00 | 185.60 | 178.00 | 169.00 | 176.80 |
| Average wheat yield (bushels) | 20 | 18.3 | 23.3 | 19.1 | 25 | 24.6 |
| Average wheat allotment (acres) | 34 | 27 | 24.3 | 29.3 | 33 | 24.5 |
| Average distance from present operation (miles) | .82 | .08 | 1.0 | 2.1 | .16 | 1.07 |
| Average size of operation (acres) | 738 | 860 | 637 | 607 | 1106 | 618 |
| Average acres in tract | 66.8 | 50 | 67.9 | 55.4 | 80 | 36.1 |
| Percent holding present lease | 14 | 33 | 14 | 27 | 33 | 15 |
| Number items | 14 | 6 | 29 | 11 | 3 | 13 |

TABLE X

RELATIONSHIP OF VARIOUS SELECTED FACTORS AND BIDDER HOLDING PRESENT LEASE ON LAND, 76 BIDS ON 32 TRACTS, MILLER TOWNSHIP, KAY COUNTY, OKLAHOMA, 1956-58

| Item | Holds Lease | Does Not Hold Lease |
|---|---|---|
| Average price per acre (dollars) | 183.50 | 178.00 |
| Average acres in tract | 59.4 | 59.6 |
| Average acres cropland | 54.6 | 57.2 |
| Average wheat yield (bushels) | 21.9 | 22 |
| Average wheat allotment (acres) | 29.6 | 26.8 |
| Average distance from present operation (miles) | .0029 | 1.3 |
| Average size of bidder's operation (acres) | 1147 | 551 |
| Number items | 17 | 59 |

TABLE XI

SELECTED STATISTICS RELATED TO ALTERNATIVE EQUATIONS FOR LAND PRICES

| | Estimates Consistent with Model | $b_o$ Value | | $b_i$ | $t_{b_i}$ | $R^2$ |
|---|---|---|---|---|---|---|
| (1) $Y = b_o + b_1X_1 + b_2X_2 + b_3X_3$ | yes | 61.653 | $b_1$ | 1.4868** | 3.15 | .22699 |
| | | | $b_2$ | -4.214* | 1.85 | |
| | | | $b_3$ | -13.96 | 1.69 | |
| (2) $Y = b_oX_1^{b_1}X_2^{b_2}X_3^{b_3}$ | yes | .7820 | $b_1$ | .73387** | 3.69 | .24899 |
| | | | $b_2$ | -.01884 | 1.55 | |
| | | | $b_3$ | -.11884 | 1.41 | |
| (3) $Y = b_o + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_1^2 + b_5X_2^2 + b_6X_3^2$ | yes | 124.879 | $b_1$ | -.2443 | .059 | .27747 |
| | | | $b_2$ | -11.72* | 2.21 | |
| | | | $b_3$ | -19.329 | .386 | |
| | | | $b_4$ | .01207 | .445 | |
| | | | $b_5$ | .6528 | 1.53 | |
| | | | $b_6$ | 1.44 | .11 | |
| (4) $Y = b_o + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_1^2 + b_5X_2^2 + b_6X_3^2 + b_7X_1X_2 + b_8X_1X_3 + b_9X_2X_3$ | no | -141.485 | $b_1$ | 4.9428 | .882 | .30333 |
| | | | $b_2$ | 101.6 | .562 | |
| | | | $b_3$ | 38.24 | .41 | |
| | | | $b_4$ | -.0125 | .388 | |
| | | | $b_5$ | .4018 | .786 | |
| | | | $b_6$ | -.9302 | .063 | |
| | | | $b_7$ | -1.2 | .645 | |
| | | | $b_8$ | -.602 | .901 | |
| | | | $b_9$ | 5.41899 | .998 | |
| (5) $Y = b_o + b_1\sqrt{X_1} + b_2\sqrt{X_2} + b_3\sqrt{X_3}$ | yes | - 21.908 | $b_1$ | 26.15** | 3.38 | .2612 |
| | | | $b_2$ | -13.77* | 2.18 | |
| | | | $b_3$ | -37.47 | 1.79 | |
| (6) $Y = b_o + b_1\sqrt{X_1} + b_2\sqrt{X_2} + b_3\sqrt{X_3} + b_4\sqrt{X_1} + b_5\sqrt{X_2} + b_6\sqrt{X_3}$ | yes | 387.937 | $b_1$ | -71.69 | .55 | .2668 |
| | | | $b_2$ | -18.26 | 1.146 | |
| | | | $b_3$ | -42.93 | .15 | |
| | | | $b_4$ | 5.73 | .74 | |
| | | | $b_5$ | 1.40 | .25 | |
| | | | $b_6$ | 3.05 | .028 | |
| (7) $Y = b_o + b_1\sqrt{X_1} + b_2\sqrt{X_2} + b_3\sqrt{X_3} + b_4\sqrt{X_4} + b_5\sqrt{X_5} + b_6\sqrt{X_6} + b_7\sqrt{X_7}$ | yes | -114.77 | $b_1$ | 28.835** | 3.12 | .5804 |
| | | | $b_2$ | -11.244 | .94 | |
| | | | $b_3$ | -15.088 | .43 | |
| | | | $b_4$ | 19.322 | 1.82 | |
| | | | $b_5$ | 3.8049 | .88 | |
| | | | $b_6$ | -.5309 | .68 | |
| | | | $b_7$ | -39.932 | 1.48 | |

Table XI (Continued)

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$X_1$ = Percent cropland

$X_2$ = Distance from present operation

$X_3$ = Land class

$X_4$ = Average wheat yield

$X_5$ = Acres cropland

$X_6$ = Size of present operation

$X_7$ = Occupation

*Significant at the 5 percent level.

**Significant at the 1 percent level.

# VITA

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Candidate for the Degree of

Master of Science

Thesis: AN ANALYSIS OF INDIAN LAND SALES IN MILLER TOWNSHIP, KAY COUNTY, OKLAHOMA, 1956-58

Major Field: Agricultural Economics

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Personal data: Born near Perry, Oklahoma, October 20, 1921, the son of John Matthew and Maude Celestine Steichen.

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Professional experience: Entered the U. S. Army in 1943 serving as an instructor in the Infantry. Veterans Agriculture Training Instructor with the Ponca City Schools and State Board for Vocational Education from 1946 to 1958. Started farming in Kay County in 1946. Selected by Junior Chamber of Commerce as Oklahoma's Outstanding Young Farmer of 1954. In 1958, recognized by Agronomy Department of Oklahoma State University as "Master Agronomist". Member of Alpha Zeta, Phi Kappa Phi and Phi Eta Sigma.